

Pycnogonida of the western Pacific islands, XII. A recent diving survey of Okinawa, Ryukyu Islands

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Abstract.—Seven known pycnogonid species are reported from the Ryukyu Islands at Okinawa, five of them found here for the first time and one new species. The new species, *Parapallene virgosa*, is described, illustrated, compared with others in its genus and with several species in other genera displaying a few similar characteristics. Previous Okinawan pycnogonid literature is discussed in light of these additional species and distribution of all species is included.

Thirteen pycnogonid species in ten genera were previously known from the Ryukyu Archipelago prior to this report. These thirteen came from the Island of Okinawa itself and the Sakishima Islands Group at the southern end of the Archipelago (Ohshima 1935, Hedgpeth 1949, Nakamura & Child 1988). There have been no pycnogonids reported from other Ryukyu Islands. The small collection of eight species reported below increases this number to eighteen species now known in a total of fifteen genera with the addition of five genera and five species previously unknown in Okinawa. One bizarre attenuated species, *Parapallene virgosa*, is described as new, illustrated, and compared with all similarly attenuated species of this and other genera.

The collection was made over the course of several years by R. F. Bolland with the use of scuba while collecting bottom samples for a faunal survey.

Key to the Families of Pycnogonida (discussed in this report)

- 1). Chelifores and palps both present or one lacking 2
- Both chelifores and palps lacking Pycnogonidae

- 2). Palps present, chelifores and chelae present or lacking 3
- Palps lacking, chelifores and chelae present Callipallenidae
- 3). Chelifores lacking 4
- Chelifores present, chelae atrophied or lacking Ammotheidae
- 4). Proboscis short, with ventral and lateral swelling, mouth a vertical slit; ocular tubercle short Rhynchothoracidae
- Proboscis long, tubular, with annulations, downcurved, mouth a tube; ocular tubercle long Austrodecidae

Systematics

Family Ammotheidae Dohrn, 1881

Genus *Achelia* Hodge, 1864

Achelia nana (Loman, 1908)

Ammothea nana Loman, 1908:60-61, pl. 1, figs. 1-13.

Achelia nana.—Child, 1983:699 [literature]; 1988a:50-51.—Stock, 1991:161; 1992:89 [text], fig. 6; 1994:35-36.

Material examined.—Okinawa, 26°30.0'N, 127°50.9'E, sta. RFB 1972, 6.1 m, 27 Aug 1988 (1 female). Same locality, sta. RFB 2001, 67.1 m, 23 Oct 1988 (1 male).

Distribution.—This long-known species has a very wide Indo-West Pacific distribution from Durban, South Africa to Aus-

tralia and Japan. It has usually been collected in intertidal depths to about 25 m. The second station above is deeper than usual for the species, although there is one record of a capture at 435 m. This species has been taken in the Philippines and on Kyushu, Japan, and would thus be expected to occur on Okinawa.

Genus *Ammothella* (Verrill, 1990)

Ammothella biunguiculata (Dohrn, 1881)

Ammothella bi-unguiculata Dohrn, 1881: 158, pl. 8, figs. 1–3.

Ammothella biunguiculata.—Stock, 1974: 12–13, fig. 1 (early literature).—Nakamura & Child, 1991:6–7 (recent literature).—Munilla, 1993:1993.—Chimenz et al., 1993:340.

Material examined.—Okinawa, 26°30.4'N, 127°52.6'E, sta. RFB 1204, 3 m, 29 Jun 1984 (1 male). Same locality, sta. RFB 1223, 3 m, 18 Jul 1984 (1 female).

Distribution.—This is one of the several common species with a “Tethyan distribution”: from Spain and the Mediterranean to Japan and Korea. It has been collected from the intertidal to 45 m. It is new to Okinawan shores.

Genus *Tanystylum* Miers, 1879

Tanystylum rehderi Child, 1970

Tanystylum rehderi Child, 1970:302–306, fig. 5; 1983:705; 1988a:53–54.—Müller, 1989:126, figs. 22–39.—Child, 1991: 142.—Stock, 1994:38–39.

Material examined.—Okinawa, 26°30.0'N, 127°50.9'E, sta. RFB 1210, 0–3 m, 3 Jul 1984 (1 male, 1 female).

Distribution.—There are several scattered localities in the Indo-Pacific where this species has been collected, from Aldabra Atoll to Indonesia, Guam, the Palau Islands, and the Society Islands, its type locality. It has, like most *Tanystylum* species, a shallow-water distribution in 0–18 m.

Remarks.—No *Tanystylum* species has been reported from Okinawa or other Ryukyu

Islands until this record. There are only three known species of *Tanystylum*, a predominantly temperate and tropical genus, reported from Japanese islands; *T. scrutator* Stock, *T. grossifemorum* (Hilton), and *T. ulreungum* Kim (synonym: *T. nabetensis* Nakamura & Child). This species is quite different from all three.

The nearest known non-Japanese species comes from the central and northern Philippines, *T. philippinensis* Child (1988b:10–12, fig. 4). This species has a tall, erect abdomen like a post or peg, has no male seventh oviger segment apophysis, and has much more tuberculate legs than *T. rehderi*. It is known from as near the Ryukyus as Guam, but this species has up to now been collected in more southern Indo-Pacific localities.

Family Callipallenidae Hilton, 1942

Genus *Callipallenidae* Flynn, 1929

Callipallene novaezealandiae (Thomson, 1884)

Pallene novae-zealandiae Thomson, 1884: 246–247, pl. 14, figs. 1–4.

Callipallene novaezealandiae.—Child, 1982: 277 [literature]; 1983:708; 1988a:27; 1991: 145.—Nakamura & Child, 1988:664; 1991:38.—Stock, 1994:48.

Material examined.—Okinawa, Tengam Pier, 3 km SSE of Ishikawa City, 26°24.0'N, 127°51.5'E, sta. RFB 1124, 12.2 m, 17 Mar 1984 (1 male). Okinawa, 26°30.4'N, 127°52.6'E, sta. RFB 1205, 51.8 m, 30 Jun 1984 (1 male). Same locality, sta. RFB 1232, 45.7 m, 30 Jul 1984 (1 juvenile). Okinawa, Buckner Bay, 26°17.8'N, 127°51.0'E, sta. RFB 1798, unknown depth, 16 Mar 1987 (1 juvenile).

Distribution.—This long-known species has broad Indo-Pacific distribution which includes Japan, and the Sakishima Islands of the Ryukyus. Its usual depth is littoral although it has been taken in as great as 275 m.

Genus *Parapallene* Carpenter, 1892
Parapallene virgosa, new species
 Fig. 1

Material examined.—Okinawa, 26°30.4'N, 127°52.6'E, sta. RFB 1227, 54.9 m, 20 Jul 1984 (1 female, holotype, USNM 234710).

Distribution.—Only known from its type locality.

Description.—Habitus extremely slender, leg span about 83 mm. Trunk cylindrical, fully segmented, no wider than slender lateral processes. Lateral processes cylindrical, slightly inflated distally, separated by 5–6 times their diameters, each with dorsodistal seta shorter than segment diameter. Neck extremely long, slender, oviger bases at posterior, not touching first lateral processes. Neck crop with chelifore and proboscis attachment very slender. Ocular tubercle at anterior of first lateral processes which are at extreme posterior of first segment. Ocular base broad, containing eyes, anterior pair larger than posterior pair, little pigment. Ocular tubercle apex with bulbous extension as tall as basal part, with sensory papillae at distal sides well above eyes. Proboscis moderately short, slightly upcurved, with distal constriction, armed with few short curved median and distal spines, lips flat, without oral setae field. Abdomen very short, erect, glabrous.

Chelifores very slender, with few robust lateral spines as long or longer than segment diameters. Chelae palms with 3 long, broad, distal spines and several shorter proximal setae. Chelae fingers very long, delicate, without teeth, overlap distally.

Oviger slender, segments four and five subequal, segment six only slightly shorter, with few short lateral and distal setae. Strigilis segments seven–nine each slightly narrower than tenth, armed with two or three short ectal setae and endal denticulate spines in formula 6:7:6:6; straight terminal claw with 12 tiny teeth. Denticulate spines with two or three pairs of lateral teeth.

Legs very slender, long, armed with few

setae on tibia, of two sizes, neither longer than segment diameter. Second tibia the longest segments, armed with two or three longer ventral spines with serrate inner edges. Femur longer than short first tibia, neither with serrate ventral spines. Tarsus very short, armed with few tiny ventral setae and one serrate sole spine shorter than terminal serrate spine of second tibia. Propodus moderately short, very slightly curved. Propodal heel with four spines, increasing in size distally, two distal spines with serrations, sole with eight or nine short spines, proximal first and second with hint of serrations. Claw almost half propodal length, moderately curved, auxiliaries slightly more than half main claw length.

Male unknown.

Measurements of female holotype in mm.—Trunk length (chelifore insertion to tip 4th lateral processes), 10.64; 1st segment length, 3.57; posterior 3 segments, 7.07; trunk width (across 2nd lateral processes), 6.1; proboscis length, 1.92; abdomen length, 0.76; third leg, coxa 1, 0.86, coxa 2, 3.82; coxa 3, 1.28; femur, 9.78; tibia 1, 8.88; tibia 2, 11.42; tarsus, 0.28; propodus, 1.39; claw, 0.67.

Etymology.—The species name (Latin: *virgosus*, meaning full of twigs) refers to the twig-like appearance of the trunk and appendages on this extremely slender species. Its habitus is very similar to and brings to mind the extreme slenderness of a walking-stick insect.

Remarks.—The bizarre “stretched” trunk and lateral processes of this species fit uneasily in couplet two of Stock’s (1991a:191, 193) key to members of this genus, next to *P. parviungicularis* Stock. That is a species to which *P. virgosa* is not closely related, since the latter has longer auxiliary claws and a long terminal oviger claw. It has no close relations in this genus and only morphologically resembles species in other genera by coincidence. It most notably resembles *Anoplodactylus tenuicorpus* Child, 1988b, from the Philippines, Guam, and the Seychelles, and *A. exagger-*

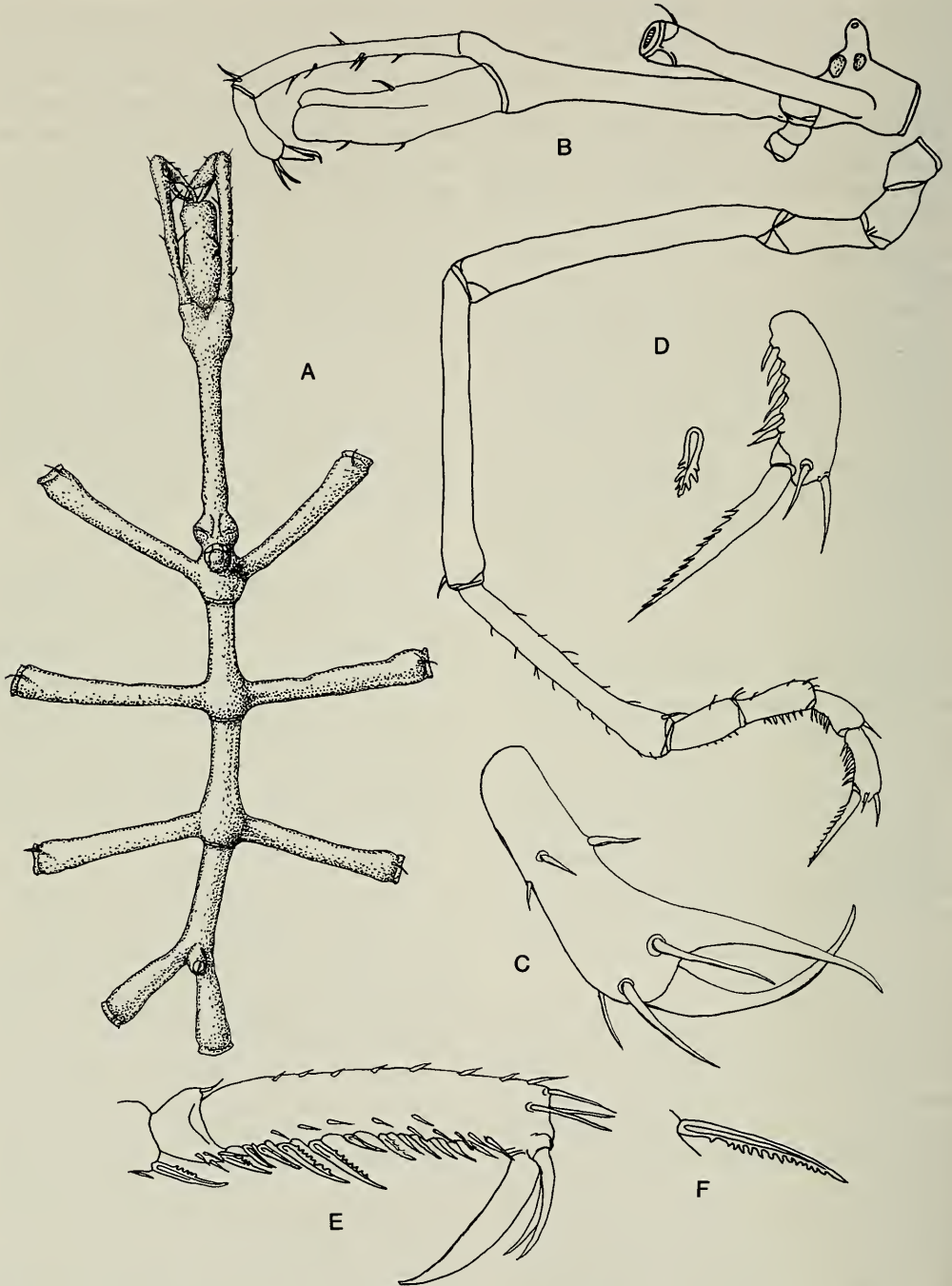


Fig. 1. *Parapallene virgosa*, new species, female holotype: A, Trunk, dorsal view; B, trunk anterior segments, lateral view; C, chela; D, oviger, with terminal segment and denticulate spine, enlarged; E, third leg distal segments, enlarged; F, Second tibia median leg spine, enlarged.

atus Stock, 1994, from Indonesia and Singapore. It should be noted that all three of these slender tenuous species have one or more serrate heel spines. There are other slender species having serrate heel spines, such as *Pseudopallene* sp. (Stock 1994:49) and *Anoplodactylus pectinus* Hedgpeth, 1948. In Hedgpeth's species, the trunk and lateral processes are much less attenuated but the propodus has one or more serrate heel spines as does Stock's *Pseudopallene* sp. It is far from clear whether or not the 2 characters of attenuation and serrate heel spines are in any way related other than by coincidence. Four otherwise unrelated species sharing these characters seems to be too much of a coincidence.

Almost all 18 species of this genus, except for two in Bermuda, Florida and the Caribbean, have been described from Indo-West Pacific localities, principally from southern Africa to Australia, New Zealand and the East Indies. This is the second species to be collected (the first being *P. nierstraszi* Loman) at what is apparently the northern extremes for this genus. Its capture strengthens the idea of a post-Tethyan north-south corridor brought about by northerly currents which continued to flow as circumtropical currents after the closure of the Tethys Sea.

Family Austrodecidae Stock, 1954
Genus *Austrodecus* Hodgson, 1907
Austrodecus tubiferum Stock, 1954

Austrodecus gordonae Stock, 1954:153 (part), fig. 76e.

Austrodecus tubiferum Stock, 1957:75–77, fig. 43.—Nakamura & Child, 1988:669; 1991:35.—Child, 1994:51 (list), 53 (text).—Stock, 1994:43–44, fig. 14b.

Material examined.—Okinawa, 26°30.4'N, 127°52.6'E, sta. RFB 1212, 6.1 m, 4 Jul 1984 (1 spec.).

Distribution.—This species was known only from Japan and Okinawa, in sublittoral depths (37–184 m), and more recently from Mauritius and Rodriguez Islands in the In-

dian Ocean. This is the only known species to be collected as far north in the Pacific as Japan. Almost all of its congeners are known only from further south and Antarctic localities.

Remarks.—There is only one species of this tiny genus known in northwest Pacific waters, making it quite easy to identify.

Family Rhynchothoracidae Thompson, 1909

Genus *Rhynchothorax* Costa, 1861
Rhynchothorax orientalis Child, 1988

Rhynchothorax orientalis Child, 1988b:28–29, fig. 12.—Stock, 1991:227.

Material examined.—Okinawa, 26°30.4'N, 127°52.6'E, sta. RFB 1222, 42.7 m, 18 Jul 1984 (1 male).

Distribution.—Known previously only from two Philippine localities; the type was captured in 1–3 m, and the second was found in 92–97 m. Its distribution is herein extended to Okinawa and to the intermediate depth of 43 m.

Remarks.—The bifurcate tubercles of the trunk and ocular tubercles and the tubercles of the first coxae are all slightly larger than those of the type which is apparently a female. This could be expected in a male. The anterior ocular tubercle extension or projection is apparently a common character in several *Rhynchothorax* species. This character is shared with *R. mediterraneus* Costa, and *R. percivali* Clark. The shorter posterior and longer anterior legs are an even more common phenomenon among species of this genus.

Family Pycnogonidae Wilson, 1878
Genus *Pycnogonum* Brünnich, 1764
Pycnogonum benokianum Ohshima, 1935

Pycnogonum benokianum Ohshima, 1935:137–139.—Ohshima & Kishida, 1947:1010, fig. 2866.—Hedgpeth, 1949:304–307, fig. 49.—Utinomi, 1971:327.—Nakamura & Child, 1988:662 [text].

Material examined.—Okinawa, 26°30.

0°N, 127°50.9'E, sta. RFB 1973, 3 m, 27 Aug 1988 (1 male).

Distribution.—This is the second known record for this species and it is known only from Okinawa. Hedgpeth (1949) re-described and illustrated the types while subsequent records only repeated the type information.

Remarks.—This male reveals almost no variation from Hedgpeth's (1949:305, fig. 49) figures of the male type. The ovigers of this specimen are slightly shorter but that may be due to the angle at which the type's oviger was drawn. The trunk tubercles are slightly less conspicuous and lower than those of the type, but the proboscis is barrel-shaped like that of the type figured by Hedgpeth.

Acknowledgments

I wish to extend my gratitude to the collector, R. F. Bolland, for depositing his collections with the National Museum of Natural History and to the personnel of the Smithsonian Oceanographic Sorting Center for sorting the pycnogonids for my examination.

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